**Glyphosate IARC information**

**IARC information on roles and responsibilities of various IARC meeting attendees:**

- Attachment #1 is the portion of the IARC preamble that explains the roles, responsibilities, and selection criteria for the various IARC meeting participant types.
- Attachment #2 is a list of participants for the March 2015 IARC meeting.
- As you can see, only Matt Martin (listed as a member) and Jess were in attendance from EPA.
- Note that Jess is listed as a "representative of national and international health agencies" and thus was not allowed to draft any part of the monograph or participate in the evaluations. He was only allowed to comment but his comments were not included in the evaluation.

**Information related to the selection of Matt Martin (only EPA employee who participated as a member on the IARC glyphosate meeting):**

IARC provided a call for experts to serve on the Monograph 112 panel (http://monographs.iarc.fr/ENG/Meetings/vol112-callexperts.php). Dr. Ivan Rusyn, a chair of a Monograph 112 subgroup "Section 4: Mechanisms and other relevant data", encouraged Dr. Martin to complete the self-nomination call for experts. The required documents and forms were completed and sent to IARC for consideration. Dr. Kate Guyton, the Responsible Officer for Monograph 112, replied on 4/15/2014 confirming receipt of self-nomination and an official invitation was sent to Dr. Martin on 06/12/2014. Dr. Martin served on the expert panel from 3/3/2015-3/10/2015 under the "Mechanisms and other relevant data" subgroup as an expert in mechanistic and computational toxicology.

**ATTACHMENT #1- IARC Preamble section on meeting participants**

5. Meeting participants

Five categories of participant can be present at *Monograph* meetings.

(a) The Working Group is responsible for the critical reviews and evaluations that are developed during the meeting. The tasks of Working Group Members are: (i) to ascertain that all appropriate data have been collected; (ii) to select the data relevant for the evaluation on the basis of scientific merit; (iii) to prepare accurate summaries of the data to enable the reader to follow the reasoning of the Working Group; (iv) to evaluate the results of epidemiological and experimental studies on cancer; (v) to evaluate data relevant to the understanding of mechanisms of carcinogenesis; and (vi) to make an overall evaluation of the carcinogenicity of the exposure to humans. Working Group Members generally have published significant research related to the carcinogenicity of the agents being reviewed, and IARC uses literature searches to identify most experts. Working Group Members are selected on the basis of (a) knowledge and experience and (b) absence of real or apparent conflicts of interests. Consideration is also given to demographic diversity and balance of scientific findings and views.

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Before an invitation is extended, each potential participant, including the IARC Secretariat, completes the WHO Declaration of Interests to report financial interests, employment and consulting, and individual and institutional research support related to the subject of the meeting. IARC assesses these interests to determine whether there is a conflict that warrants some limitation on participation. The declarations are updated and reviewed again at the opening of

the meeting. Interests related to the subject of the meeting are disclosed to the meeting participants and in the published volume (Cogliano *et al.*, 2004).

The names and principal affiliations of participants are available on the Monographs programme website (http://monographs.iarc.fr) approximately two months before each meeting. It is not acceptable for Observers or third parties to contact other participants before a meeting or to lobby them at any time. Meeting participants are asked to report all such contacts to IARC (Cogliano *et al.*, 2005).

All participants are listed, with their principal affiliations, at the beginning of each volume. Each participant who is a Member of a Working Group serves as an individual scientist and not as a representative of any organization, government or industry.

ATTACHMENT #2: List of participants for the March 2015 IARC meeting

***IARC Monographs on the Evaluation of Carcinogenic Risks to Humans* VOLUME 112: SOME ORGANOPHOSPHATE INSECTICIDES AND HERBICIDES: DIAZINON, GLYPHOSATE, MALATHION, PARATHION, AND TETRACHLORVINPHOS Lyon, France: 3-10 March 2015**

**LIST OF PARTICIPANTS**

**Members**

Isabelle Baldi, University of Bordeaux, France
Aaron Blair, National Cancer Institute, USA [retired] (Overall Chair)
Gloria M. Calaf, Tarapaca University, Chile
Peter P. Egeghy, U.S. Environmental Protection Agency, USA[1] (Unable to attend)
Francesco Forastiere, Regional Health Service of the Lazio Region, Italy (Subgroup Chair, Cancer in Humans)
Lin Fritschi, Curtin University, Australia (Subgroup Chair, Exposure)
Gloria D. Jahnke, National Institute of the Environmental Health Sciences, USA
Charles W. Jameson, CWJ Consulting, LLC, USA (Subgroup Chair, Cancer in Experimental Animals)
Hans Kromhout, Utrecht University, The Netherlands
Frank Le Curieux, European Chemicals Agency, Finland
Matthew T. Martin, U.S. Environmental Protection Agency, USA
John McLaughlin, University of Toronto, Canada
Teresa Rodriguez, National Autonomous University of Nicaragua, Nicaragua (Unable to attend)
Matthew K. Ross, Mississippi State University, USA
Ivan I. Rusyn, Texas A&M University, USA (Subgroup Chair, Mechanisms)
Consolato Maria Sergi, University of Alberta, Canada
Andrea 't Mannetje, Massey University, New Zealand
Lauren Zeise, California Environmental Protection Agency, USA

**Invited Specialists**

Christopher J. Portier, Agency for Toxic Substances and Disease Registry, USA [retired][2]

*IARC Monographs on the Evaluation of Carcinogenic Risks to Humans* **VOLUME 112: SOME ORGANOPHOSPHATE INSECTICIDES AND HERBICIDES: DIAZINON, GLYPHOSATE, MALATHION, PARATHION, AND TETRACHLORVINPHOS Lyon, France: 3-10 March 2015**

**Representatives of national and international health agencies**

Amira Ben Amara, National Agency for Sanitary and Environmental Product Control, Tunisia (Unable to attend)

Catherine Eiden, U.S. Environmental Protection Agency, USA (Unable to attend)

Marie-Estelle Gouze, for the French Agency for Food, Environment and Occupational Health and Safety, France

Jesudosh Rowland, U.S. Environmental Protection Agency, USA

**Observers**

Mette Kirstine Boye Jensen, for Cheminova A/S, Denmark[3]

Mette Kristine Boye Kristensen is employed by Cheminova A/S, Denmark, a global company developing, producing and marketing crop protection products.

Tom Sorahan is a member of the European Glyphosphate Toxicology Advisory Panel, and received reimbursement of travel cost from Monsanto to attend EuroTox 2012.

Christian Strupp is employed by ADAMA Agricultural Solutions Ltd, Israel, a producer of Diazinone and Glyphosphate.

Patrice Sutton's attendance of this Monographs meeting is supported by the Clarence E. Heller Charitable Foundation, a philanthropic charity with a mission to protect and improve the quality of life through support of programs in the environment, human health, education and the arts.

Béatrice Fervers, for the Léon Bérard Centre, France

Elodie Giroux, University Jean-Moulin Lyon 3, France

Thomas Sorahan, for Monsanto Company, USA[4]

Christian Strupp, for the European Crop Protection Association, Belgium[5]

Patrice Sutton, for the University of California, San Francisco, Program on Reproductive Health and the Environment, USA

**IARC secretariat**

Lamia Benbrahim-Tallaa, Section of *IARC Monographs*

Rafael Carel, Visiting Scientist, University of Haifa, Israel, Section of *IARC Monographs*

Fatiha El Ghissassi, Section of *IARC Monographs*

Sonia El-Zaemey, Section of the Environment

Yann Grosse, Section of *IARC Monographs*

Neela Guha, Section of *IARC Monographs*

Kathryn Guyton, Section of *IARC Monographs (Responsible Officer)*

Charlotte Le Cornet, Section of the Environment

Maria Leon Roux, Section of the Environment and Radiation

***IARC Monographs on the Evaluation of Carcinogenic Risks to Humans* VOLUME 112: SOME ORGANOPHOSPHATE INSECTICIDES AND HERBICIDES: DIAZINON, GLYPHOSATE, MALATHION, PARATHION, AND TETRACHLORVINPHOS Lyon, France: 3-10 March 2015**

Dana Loomis, Section of *IARC Monographs*
Heidi Mattock, Section of *IARC Monographs (Editor)*
Chiara Scoccianti, Section of *IARC Monographs*
Andy Shapiro, Visiting Scientist, Section of *IARC Monographs*
Kurt Straif, Section of *IARC Monographs (Section Head)*
Jiri Zavadil, Section of Mechanisms of Carcinogenesis

**NOTE REGARDING CONFLICTS OF INTERESTS:** Each participant submitted WHO's Declaration of Interests, which covers employment and consulting activities, individual and institutional research support, and other financial interests. Participants identified as Invited Specialists did not serve as meeting chair or subgroup chair, draft text that pertains to the description or interpretation of cancer data, or participate in the evaluations. The Declarations were updated and reviewed again at the opening of the meeting.

**NOTE REGARDING OBSERVERS:** Each Observer agreed to respect the Guidelines for Observers at *IARC Monographs* meetings. Observers did not serve as meeting chair or subgroup chair, draft any part of a *Monograph*, or participate in the evaluations. They also agreed not to contact participants before the meeting, not to lobby them at any time, not to send them written materials, and not to offer them meals or other favours. IARC asked and reminded Working Group Members to report any contact or attempt to influence that they may have encountered, either before or during the meeting.

Posted on 26 January 2015, updated 30 March 2015

## 4.3 Data relevant to comparisons across agents and endpoints

### 4.3.1. General description of the database

High throughput screening (HTS) data generated by the Tox21 and ToxCast research programs of the US government (Tice et al., 2013; PMID 1205784, Kavlock et al 2012 PMID: 22519603) were analysed to inform evaluations about the *in vitro* bioactivity of the chemicals included in IARC monograph volume 112. Diazinon, malathion, and parathion, as well as the oxon metabolites, malaoxon and diazoxon, are among the approximately 1000 chemicals tested across the full ToxCast/Tox21 assay battery as of 3 March 2015. This assay battery includes 342 assays, for which data on 821 assay endpoints are publicly available in the US EPA ToxCast Dashboard (www.actor.epa.gov/dashboard). Z-Tetrachlorvinphos (CASRN 22248-79-9; a structural isomer of tetrachlorvinphos) and the oxon metabolite of parathion, paraoxon, are among an additional 800 chemicals tested as part of an endocrine profiling effort using a subset of these assays. Glyphosate was not tested in the ToxCast/Tox21 assays.

Detailed information about the chemicals, assays and associated data analysis procedures is also publicly available from (www.epa.gov/toxcast/data). It is of note that while the cell-based assays have a variable degree of metabolic capacity, it is generally limited. [Additionally, the Working Group noted that limited activity of the oxon metabolites in *in vitro* systems may be attributed to high reactivity and short half-life of these compounds making interpretation of the results of in vitro assays difficult].

### 4.3.2. Aligning *in vitro* assays to 10 "key characteristics" of known human carcinogens

In order to explore the bioactivity profiles of the compounds under evaluation in the Monograph volume 112 with respect to their potential impact on mechanisms of carcinogenesis, the Working Group members first mapped the 821 available assay endpoints in Tox21/ToxCast to 10 Key Characteristics of known human carcinogens (REF to IARC instructions for Section 4

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"key characteristics" table). Independent assignments were made by the Working Group members and IARC Monographs staff for each assay type to the one or more "key characteristics". The assignment was based on the biological target being probed by each assay. The consensus assignments comprise 274 assay endpoints that mapped to 7 of the 10 "key characteristics" as shown below.

1) *Is Electrophilic or Can Be Metabolically Activated (31 assay endpoints)*: All assay endpoints measure cytochrome p450 (CYP) inhibition, including aromatase. These assay endpoints are not direct measures of electrophilicity or metabolic activation.

2) *Is Genotoxic (9 assay endpoints):* The only assay endpoints that mapped to this characteristic measure p53 activity. [The Working Group noted that while these assays are not direct measures of genotoxicity, they are an indicator of DNA damage].

3) *Alters DNA repair or causes genomic instability (0 assay endpoints):* No assay endpoints were mapped to this characteristic.

4) *Induces Epigenetic Alterations (11 assay endpoints):* Assay endpoints mapped to this characteristic measure targets associated with DNA binding and histone modification (e.g., HDAC).

5) *Induces Oxidative Stress (18 assay endpoints):* A diverse collection of assay endpoints measured oxidative stress via cell imaging as well as markers of oxidative stress (e.g., NRF2).

6) *Induces chronic inflammation (45 assay endpoints):* Assay endpoints mapped to this characteristic included inflammatory markers (e.g., IL8 and NFkB activity).

7) *Is Immunosuppressive (0 assay endpoints):* No assay endpoints were mapped to this characteristic.

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8) *Modulates receptor-mediated effects (92 assay endpoints):* A large and diverse collection of cell-free and cell-based nuclear and other receptor assays were mapped to this characteristic.

9) *Causes Immortalization (0 assay endpoints):* No assay endpoints were mapped to this characteristic.

10) *Alters cell proliferation/death or nutrient supply (68 assay endpoints):* A collection of assay endpoints measuring cytotoxicity, mitochondrial toxicity, cell cycle and cell proliferation were mapped to this characteristic.

The match of an assay to the "key characteristic" were to provide additional insights into the bioactivity profile of each chemical under evaluation with respect to their potential to interact with, or have an effect on, targets that may be associated with carcinogenesis. In addition, for each chemical the results of the *in vitro* assays that represent each "key characteristic" can be compared to the results for a larger compendium of substances with similar *in vitro* data.

The Working Group then determined whether a chemical was "active" or "inactive" for each of the selected 274 assay endpoints. Activity calls were determined based on the raw concentration-response data in the ToxCast database using methods published previously (Sipes et al., 2013 PMID: 23611293) and available online (www.epa.gov/toxcast/data). In the analysis by the Working Group, each "active" was given a value of 1, and each "inactive" was given a value of 0.

Next, to integrate the data across individual assay endpoints into the cumulative score for each "key characteristic", the Toxicological Prioritization Index (ToxPi) approach (Reif et al., 2010 PMID: 20826373) and associated software (Reif et al., 2013 PMID: 23202747) were used. In the Working Group's analyses, the ToxPi score provides a measure of the potential for a chemical to be associated with a "key characteristic" relative to the other 178 chemicals that have been previously evaluated in the IARC monographs that were screened in ToxCast. Assay endpoint

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data were available in ToxCast on these 178 chemicals and not on the other chemicals previously evaluated by IARC. ToxPi is a dimensionless index score that integrates of multiple different assay results and displays them visually. The overall score for a chemical takes into account score for all other chemicals in the analysis. Different data are translated into ToxPi scores to derive slice-wise scores for all compounds as detailed below and in the publications describing the approach and the associated software package (Reif et al., 2013 PMID: 23202747). Within the individual slice, the values are normalized from 0 to 1 based on the range of responses across all chemicals that were included in the analysis by the Working Group.

The list of ToxCast/Tox21 assay endpoints included in the Working Group's analysis, description of each assay endpoint's target and/or model system (e.g., cell type, species, detection technology, etc.), their mapping to 7 of the 10 "key characteristics" of known human carcinogens, and the active/inactive calls for each chemical are available as ***Supplemental Material*** to the Monograph. In addition, the ToxPi software-generated output files for each "key characteristic" are also provided in the supplemental material and can be opened using ToxPi software (Reif et al., 2013 PMID: 23202747) that is freely available for download without a license.

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**4.3.3. Malathion-specific effects across 7 of the 10 "key characteristics" based on *in vitro* screening data.**

Relative effects of malathion and malaoxon were compared to 178 of the over more than 800 IARC Monographs-evaluated chemicals that also were screened by Tox21/ToxCast program, and the other 3 IARC Monograph volume 112 compounds and 3 IARC Monograph volume 112 metabolites. Of the total 178 IARC Monographs-evaluated chemicals, 8 were Group 1, 16 were Group 2A, 58 were Group 2B, 95 were Group 3, and 1 was Group 4. The results are presented as a rank order of all compounds in the analysis arranged in the order of their relative effect. The relative position of malathion and malaoxon in the ranked list is also shown on the y-axis. The inset in the scatter plot shows the components of the ToxPi chart as sub-categories that comprise assay endpoints in each characteristic, as well as their respective color-coding. On the top part of the right-hand side graph, two top-ranked chemicals in each analysis are shown to represent the maximum ToxPi score with the scores in parentheses. At the bottom of the right-hand side, ToxPi images and scores (in parentheses) for malathion and malaoxon are shown.

1. "**Electrophilic or ability to undergo metabolic activation**." Malathion and malaoxon were tested in 31 assay endpoints and malathion was found to be active in 20 of the 29 CYP inhibition and 1 out of 2 aromatase inhibition assay endpoints. Overall, it was the top ranked chemical in this comparison. Malaoxon demonstrated moderated CYP inhibition with 7 of 29 active assay endpoints. The 31 assay endpoints that were mapped to this characteristic are in sub-categories of CYP inhibition (29) and aromatase inhibition (2).

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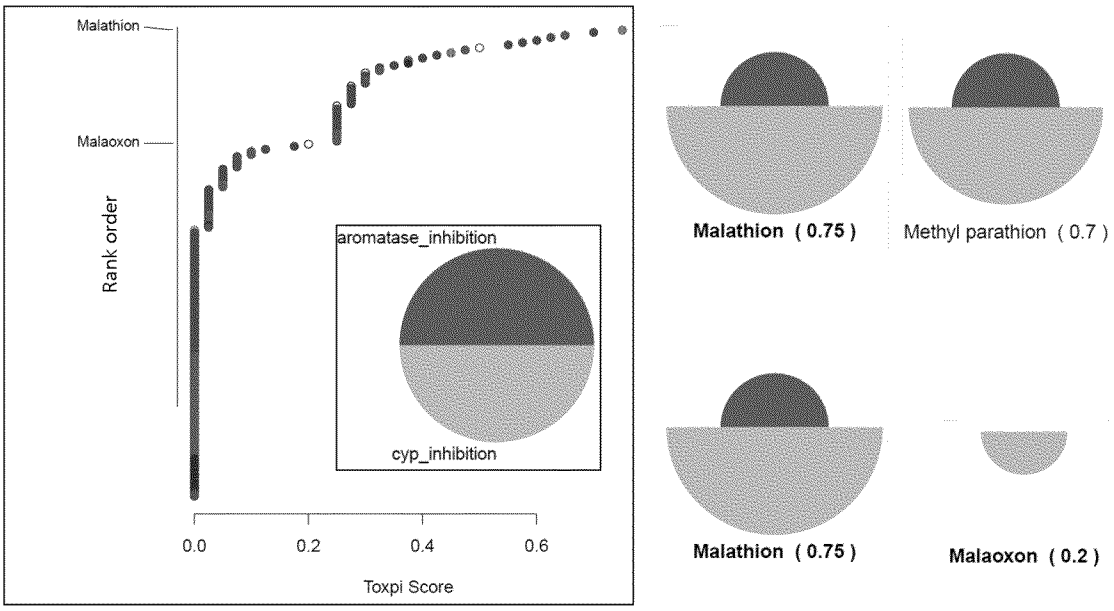
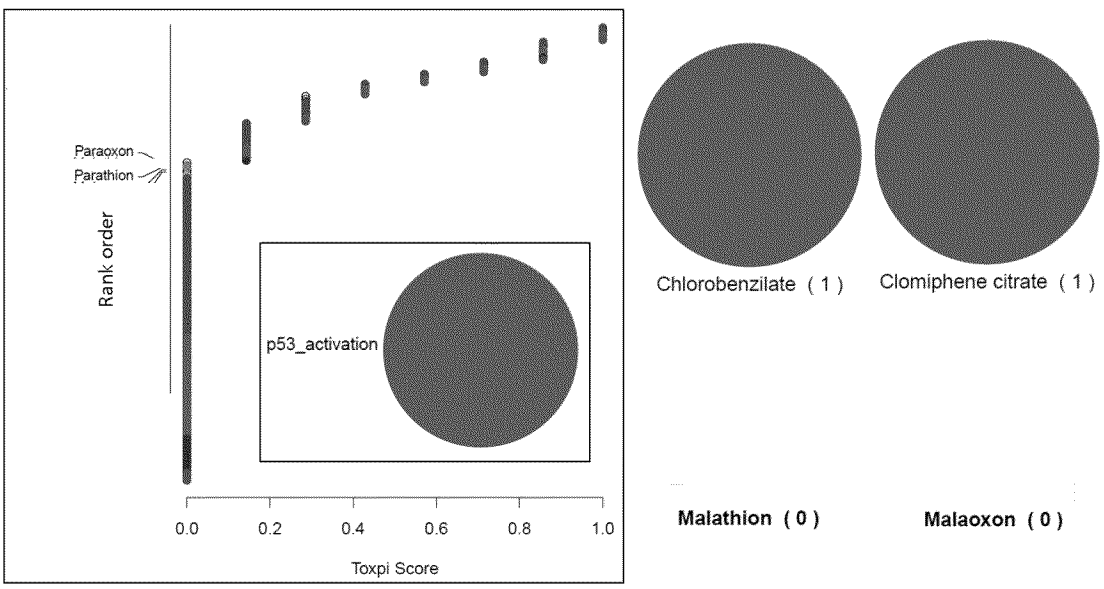



2. "**Genotoxic**." Malathion and malaoxon were tested in 9 p53 assay endpoints and were found to be inactive in all of them.

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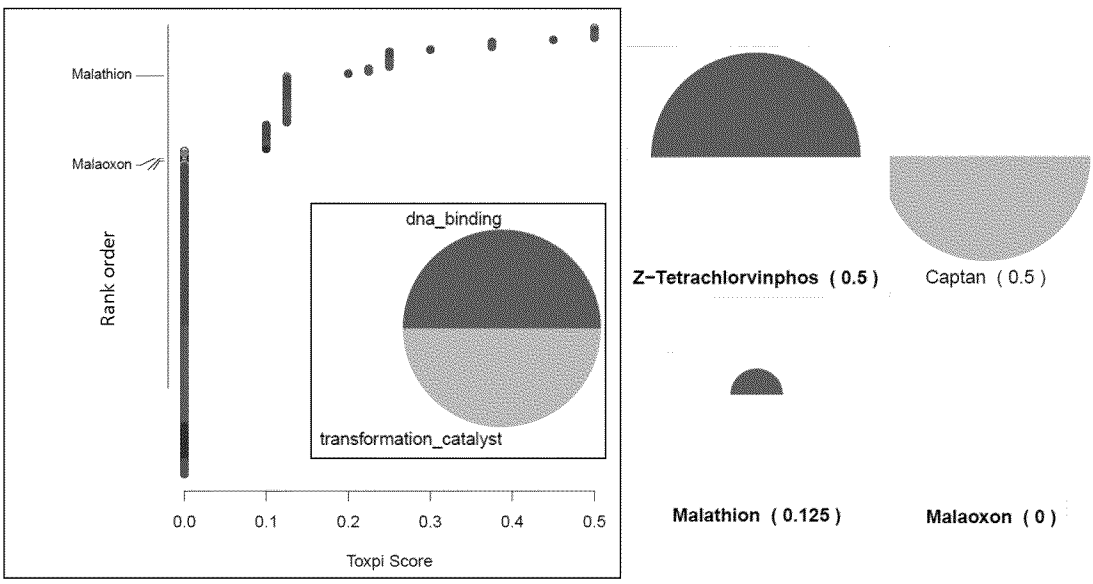
4. "**Epigenetic alterations**." Malathion and malaoxon were tested in 11 assay endpoints and malathion showed activity in 1 of 4 DNA binding assay endpoints. Malaoxon was found to be inactive in all assay endpoints. The 11 assay endpoints that were mapped to this characteristic are in sub-categories of DNA binding (4) and transformation (7).




5. "**Oxidative Stressor.**" Malathion and malaoxon were tested in 18 assay endpoints and were only active in 3 and 2, respectively, of 6 oxidative stress marker assay endpoints. Malathion and malaoxon exhibited intermediate activity, as compared to top ranked chemicals benzo(b)fluoranthene and 4-chloro-1,2-diaminobenzene. The 18 assay endpoints that were mapped to this characteristic are in sub-categories of metalloproteinase (5), oxidative stress (7), and oxidative stress marker (6).

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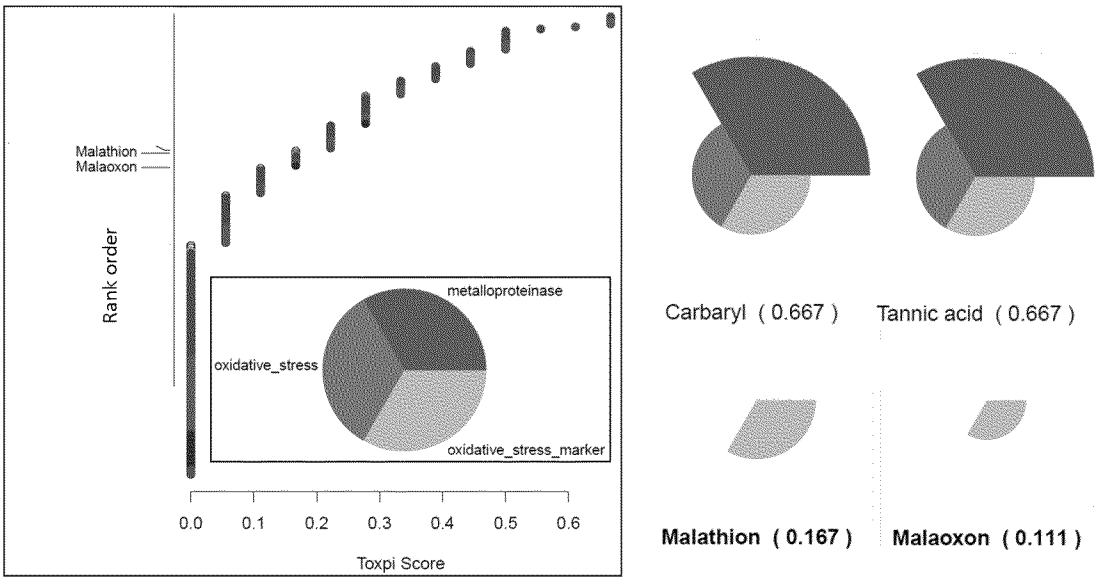
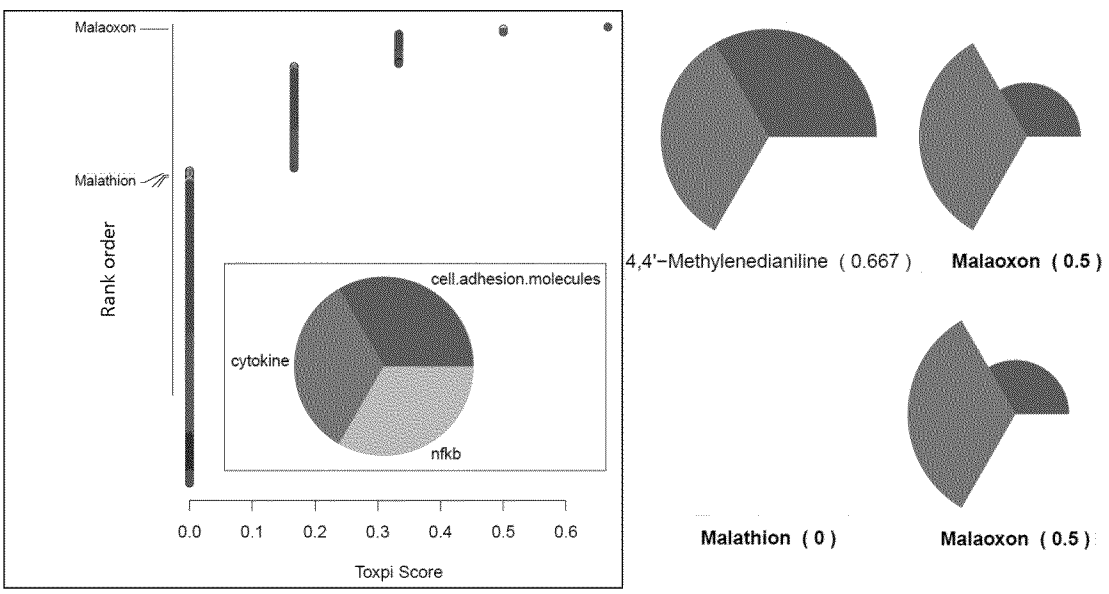



6. "**Induce chronic inflammation**." Malathion and malaoxon were tested in 45 assay endpoints with malathion showing no activity in any assay endpoint. Malaoxon was the second top ranked chemical largely based on its cytokine and cell adhesion activity with 2 and 1 actives, respectively. The top ranked chemical, 4,4'-methylenedianiline, was also only active in 2 out of 29 cytokine and 2 out of 14 cell adhesion assay endpoints, demonstrating high selectivity in these assay endpoints across this chemical set. The 45 assay endpoints that were mapped to this characteristic are in sub-categories of cell adhesion (14), cytokines (29) and NFkB (2).

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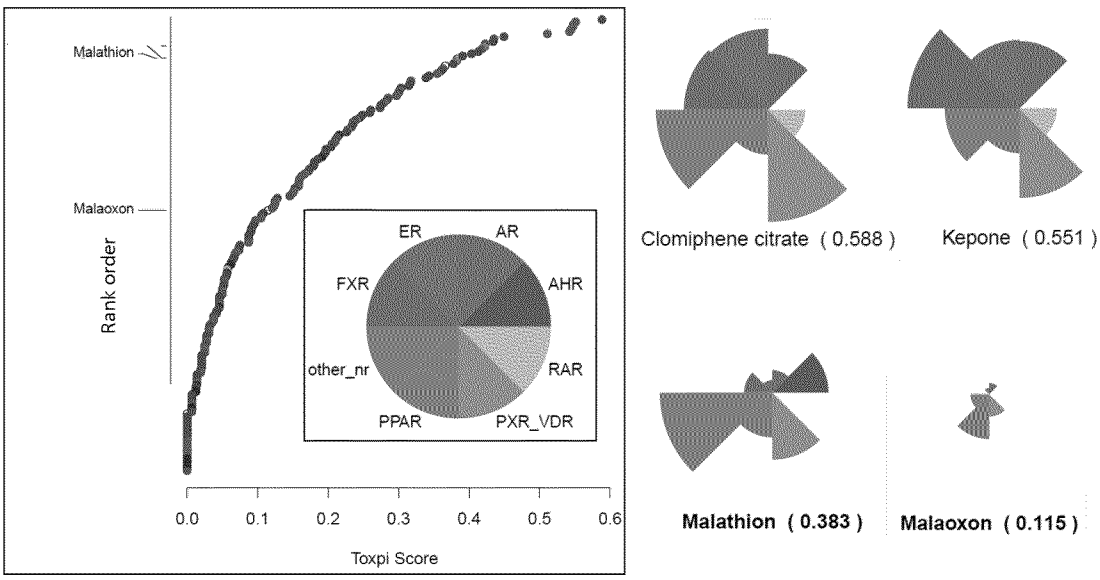
8. "**Modulates receptor-mediated effects**." Malathion and malaoxon were tested in 92 assay endpoints and were active in 17 and 6 assay endpoints, respectively. Malathion was active in 3 PXR assays and showed activity for other nuclear receptors, specifically RXR assay endpoints. Malaoxon was generally inactive in these assay endpoints. The 92 assay endpoints that were mapped to this characteristic are in sub-categories of AhR (2), AR (11), ER (18), FXR (7), others (18), PPAR (12), PXR_VDR (7), and RAR (6).




10. "**Alters cell proliferation, cell death and nutrient supply**." Malathion and malaoxon were tested in all assay endpoints except a single missing assay endpoint for malaoxon. Malathion and malaoxon both showed little to no activity. The 68 assay endpoints were mapped to this characteristic in sub-categories of cell cycle (16), cytotoxicity (41), mitochondrial toxicity (7) and proliferation (4).

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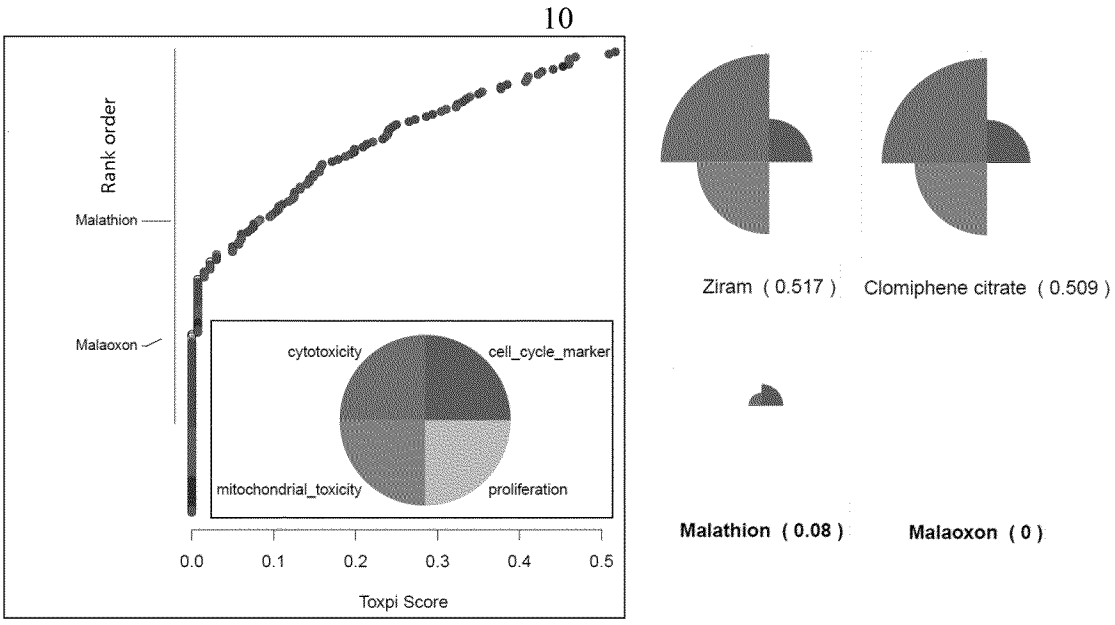


Overall, malathion demonstrated consistent activity for CYP inhibition and effects on the nuclear receptors and related proteins, most notably PXR and AhR. Malaoxon showed a high ranking for chronic inflammation, but the assigned assay endpoints were highly selective with a maximum of 4 actives across all 45 assay endpoints. Even with concerns for the stability of malaoxon in *in vitro* systems, it was found to be active in a number of independent assay endpoints, including in cell-free and cell-based assays.

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- Note that Jess is listed as a "representative of national and international health agencies" and thus was not allowed to draft any part of the monograph or participate in the evaluations. He was only allowed to comment but his comments were not included in the evaluation.

**Information related to the selection of Matt Martin (only EPA employee who participated as a member on the IARC glyphosate meeting):**

IARC provided a call for experts to serve on the Monograph 112 panel (http://monographs.iarc.fr/ENG/Meetings/vol112-callexperts.php). Dr. Ivan Rusyn, a chair of a Monograph 112 subgroup "Section 4: Mechanisms and other relevant data", encouraged Dr. Martin to complete the self-nomination call for experts. The required documents and forms were completed and sent to IARC for consideration. Dr. Kate Guyton, the Responsible Officer for Monograph 112, replied on 4/15/2014 confirming receipt of self-nomination and an official invitation was sent to Dr. Martin on 06/12/2014. Dr. Martin served on the expert panel from 3/3/2015-3/10/2015 under the "Mechanisms and other relevant data" subgroup as an expert in mechanistic and computational toxicology.

**ATTACHMENT #1- IARC Preamble section on meeting participants**

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(b) Invited Specialists are experts who also have critical knowledge and experience but have a real or apparent conflict of interests. These experts are invited when necessary to assist in the Working Group by contributing their unique knowledge and experience during subgroup and plenary discussions. They may also contribute text on non-influential issues in the section on exposure, such as a general description of data on production and use (see Part B, Section 1). Invited Specialists do not serve as meeting chair or subgroup chair, draft text that pertains to the description or interpretation of cancer data, or participate in the evaluations.

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**LIST OF PARTICIPANTS**

**Members**

Isabelle Baldi, University of Bordeaux, France
Aaron Blair, National Cancer Institute, USA [retired] (Overall Chair)
Gloria M. Calaf, Tarapaca University, Chile
Peter P. Egeghy, U.S. Environmental Protection Agency, USA[1] (Unable to attend)
Francesco Forastiere, Regional Health Service of the Lazio Region, Italy (Subgroup Chair, Cancer in Humans)
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**Representatives of national and international health agencies**

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Catherine Eiden, U.S. Environmental Protection Agency, USA (Unable to attend)

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Posted on 26 January 2015, updated 30 March 2015

**CHLORPYRIFOS TIMELINE**

| | |
|---|---|
| **World War II** | The Nazis developed organophosphates during World War II as nerve gas agents (Sarin gas is in this family of chemicals). After the war, the chemical companies adapted the organophosphates to be used as pesticides, primarily as insecticides. |
| **1965** | Chlorpyrifos is an organophosphate pesticide first registered as an insecticide in the U.S. for both agricultural and residential uses, before *Silent Spring* and adoption of environmental and health standards in U.S. laws governing pesticide use. |
| **1995** | EPA orders DowElanco to pay $876,000, the largest fine up to that time, for violating a federal law requiring it to report human health problems from chlorpyrifos. |
| **2000** | Dow stops home uses of chlorpyrifos after EPA finds unacceptable risks to children who crawl on treated carpets or hug their pets after a flea bomb. Termiticide uses are also phased out. |
| **2001 & 2006** | EPA re-registers chlorpyrifos and the other organophosphates, purporting to bring them into compliance with health and environmental standards put in place after they were initially registered for use in the U.S. EPA allowed risks of poisonings to workers to continue, ignored pesticide drift, and dismissed the growing evidence that prenatal exposures damage children's brains. |
| **2000s** | Air monitoring detects chlorpyrifos at levels that exceed what EPA considered safe for children. California Air Resources Board monitoring finds chlorpyrifos at elementary schools and other sites near orange fields in Tulare County, California at unsafe levels. |
| **2007** | On behalf of UFW and other farmworker advocates, Earthjustice and Farmworker Justice file a lawsuit challenging EPA's re-registration of chlorpyrifos despite the harm to workers and from toxic drift.<br><br>Pesticide Action Network and Natural Resources Defense Council file petition seeking a ban on chlorpyrifos based on evidence of brain damage from prenatal exposures and toxic drift. |
| **2009** | On behalf of farmworkers and health advocates, Earthjustice files a petition asking EPA to protect children from pesticide drift. |
| **2000s to the present** | Centers for Children's Environmental Health and Disease Prevention Research at Columbia, Berkeley, and Mt. Sinai study children exposed to CPR *in utero* and find statistically significant neurodevelopmental harm including reduced IQ, delayed development, loss of working memory, and attention deficit disorders. A 2012 study found chlorpyrifos exposure led to changes in the physical structure of the developing brain. |
| **2011** | EPA documents toxic drift from chlorpyrifos in its preliminary risk assessment, and |

| | |
|---|---|
| | EPA acknowledges its legal obligation to protect children from pesticide drift. |
| **2012** | EPA reaches an agreement with the chlorpyrifos registrants to put buffer zones around schools, day cares, homes, playfields, and other places occupied by people. The buffer zones vary in size from 10 feet for ground boom applications, 10-50 for air blast applications depending on the amount applied, and 10-100 for aerial spraying depending on the amount applied and the droplet size. In setting the buffer zones, EPA ignored direct drift onto people and inhalation exposures from ground boom and air blast spraying. |
| **December 2014** | EPA releases its revised human health risk assessment:<br><br>(1) acknowledging the extensive body of peer-reviewed science correlating chlorpyrifos exposure with brain damage to children and that the brain damage occurred at exposures far below EPA's regulatory endpoint based on acute pesticide poisoning risks;<br><br>(2) finding acute poisoning risks of concern to workers from over 200 activities, including mixing and loading various pesticide formulations, air blast, aerial, and ground boom spraying, and re-entering fields after spraying to perform tasks like thinning, irrigating, and hand harvesting. |
| **March-June, 2015** | EPA represented that it was going to negotiate with the registrants to agree to mitigation or stopping activities that expose workers to excessive poisoning risks. By June, 2015, those negotiations had stalled. |
| **August 2015** | 9th Circuit Court of Appeals orders EPA to act on the 2007 petition to ban chlorpyrifos by Halloween. |
| **October 2015** | EPA proposes to revoke all food tolerances based on drinking water contamination, but it holds open the possibility that it might be able to allow some uses to continue. EPA takes no action to stop nonfood uses or to protect workers from unacceptable risks. |
| **January 2016** | More than 80,000 people submit comments on the proposal, urging EPA to ban all uses of chlorpyrifos, not just on food crops, and to start proceedings to stop uses that harm workers. |
| **August 2016** | 9th Circuit Court of Appeals gives EPA a deadline of March 31, 2017 to take final action on the 2007 petition to ban chlorpyrifos and its proposed revocation of food tolerances. |
| **September 2016** | On behalf of UFW [list all petitioners, Earthjustice and Farmworker Justice petition EPA to immediately suspend all chlorpyrifos uses that pose unacceptable risks to workers. |

## CHLORPYRIFOS BACKGROUND

Chlorpyrifos is an organophosphate (OP), a group of pesticides that cause acute pesticide poisonings when people come into contact with them. They suppress an enzyme that regulates nerve impulses through the body. When this enzyme – cholinesterase – is inhibited, people can experience a range of symptoms from nausea, vomiting, headaches, and dizziness to seizures, paralysis, and even death in some instances. Not only do these pesticides put our nation's farmworkers at risk of pesticide poisonings, but they also contaminate food and drinking water and expose children and other bystanders to toxic drift.

EPA had a 2006 deadline to ensure that children would be protected from exposures to pesticides in food, drinking water, and other activities. When EPA looked at kids' exposures around homes from crawling on carpets and lawns or hugging their pets after flea treatments, it found the risks extremely alarming and convinced the chemical companies to cancel all homeowner uses in 2000. EPA ignored children in rural areas who are exposed to pesticides that drift from the fields to schools, homes and playfields. After a series of lawsuits and petitions, EPA acknowledged its legal obligations to protect kids from toxic pesticide drift. In July 2012, EPA required no-spray buffers around schools, homes, playgrounds and other places children gather. However, there are documented poisonings from chlorpyrifos drift that extend far beyond the "no-spray" buffer boundaries.

In December 2014, EPA finally acknowledged the extensive scientific evidence documenting damage to children's developing brains from chlorpyrifos exposures, including such alarming effects as reduced IQ, loss of working memory, delayed motor development, and attention disorders. EPA also found that these brain impacts occurred at far lower doses than EPA's regulatory limit set to prevent acute pesticide poisonings. EPA nonetheless continued to use acute pesticide poisoning endpoint despite brain damage occurring at far lower doses.

A separate court case obtained a court order requiring EPA to act on a 2007 petition to ban chlorpyrifos. To meet a court deadline, EPA proposed in October 2015 to revoke all chlorpyrifos tolerances (a tolerance allows a pesticide residue on food) because of drinking water contamination. The court has given EPA until March 31, 2017 to take final action on that proposal.

EPA's proposal to revoke tolerances is limited to food crops. The agency recently suggested that it might back away from a total ban. Additionally,the proposal does nothing to protect workers from the unacceptable risks documented by EPA.

The petition to suspend seeks immediate action to stop the uses that risk poisoning workers and that risk causing brain damage to children from prenatal exposures.

#

EARTHJUSTICE

September 21, 2016

*Via Federal Express*

Gina McCarthy, Administrator
U.S. Environmental Protection Agency Headquarters
William Jefferson Clinton Bldg.
1200 Pennsylvania Ave., NW
M/C: 1101A
Washington, DC 20460

RE: Petition for Emergency and Ordinary Suspension of Chlorpyrifos Uses that Pose Unacceptable Risks to Workers and Petition to Cancel All Uses of Chlorpyrifos

Dear Administrator McCarthy:

On behalf of United Farm Workers, League of United Latin American Citizens, Labor Council for Latin American Advancement, National Hispanic Medical Association, Farmworker Association of Florida, Pineros y Campesinos Unidos del Noroeste, Migrant Clinicians Network, Learning Disabilities Association of America, California Rural Legal Assistance Foundation, and GreenLatinos, we are filing the attached combined petition asking the Environmental Protection Agency ("EPA") to suspend and cancel chlorpyrifos uses.

In the suspension petition, we ask EPA to suspend all uses of chlorpyrifos that: (1) pose unacceptable risks of acute pesticide poisonings to workers, as found by EPA in its Revised Human Health Risk Assessment in December 2014; and (2) pose unacceptable risks of brain impairments to children from prenatal exposures to their farmworker mothers, which occur at lower exposures and therefore encompass additional chlorpyrifos uses. In addition to seeking an ordinary suspension, we seek an emergency suspension to ensure workers will not be exposed to these risks of concern during the time it will take to put an ordinary suspension in place. The cancellation petition asks EPA to cancel all uses of chlorpyrifos to protect workers, their families, and the public from the harm caused by chlorpyrifos through our food, drinking water, work, and play.

Because this petition seeks immediate action to reduce imminent hazards that are occurring in agricultural regions throughout the country every year, we ask that you respond to this petition within 30 days.

NORTHWEST OFFICE 705 SECOND AVENUE, SUITE 203 SEATTLE, WA 98104

T: 206.343.7340 F: 206.343.1526 NWOFFICE@EARTHJUSTICE.ORG WWW.EARTHJUSTICE.ORG

We also request a meeting with you and other pertinent EPA officials at your earliest convenience to discuss the urgency and necessity of the requested suspension order.

Sincerely,

Patti A. Goldman, Esq.
Eve C. Gardner, Esq.
Tyler J.S. Smith, MPH
Andrea Delgado
Earthjustice

Virginia Ruiz, Esq.
Farmworker Justice

Enclosures

**Glyphosate IARC information**

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**ATTACHMENT #1- IARC Preamble section on meeting participants**

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Teresa Rodriguez, National Autonomous University of Nicaragua, Nicaragua (Unable to attend)
Matthew K. Ross, Mississippi State University, USA
Ivan I. Rusyn, Texas A&M University, USA (Subgroup Chair, Mechanisms)
Consolato Maria Sergi, University of Alberta, Canada
Andrea 't Mannetje, Massey University, New Zealand
Lauren Zeise, California Environmental Protection Agency, USA

**Invited Specialists**
Christopher J. Portier, Agency for Toxic Substances and Disease Registry, USA [retired][2]

*IARC Monographs on the Evaluation of Carcinogenic Risks to Humans* **VOLUME 112: SOME ORGANOPHOSPHATE INSECTICIDES AND HERBICIDES: DIAZINON, GLYPHOSATE, MALATHION, PARATHION, AND TETRACHLORVINPHOS Lyon, France: 3-10 March 2015**

**Representatives of national and international health agencies**

Amira Ben Amara, National Agency for Sanitary and Environmental Product Control, Tunisia (Unable to attend)

Catherine Eiden, U.S. Environmental Protection Agency, USA (Unable to attend)

Marie-Estelle Gouze, for the French Agency for Food, Environment and Occupational Health and Safety, France

Jesudosh Rowland, U.S. Environmental Protection Agency, USA

**Observers**

Mette Kirstine Boye Jensen, for Cheminova A/S, Denmark[3]

[3] Mette Kristine Boye Kristensen is employed by Cheminova A/S, Denmark, a global company developing, producing and marketing crop protection products.

[4] Tom Sorahan is a member of the European Glyphosphate Toxicology Advisory Panel, and received reimbursement of travel cost from Monsanto to attend EuroTox 2012.

[5] Christian Strupp is employed by ADAMA Agricultural Solutions Ltd, Israel, a producer of Diazinone and Glyphosphate.

[6] Patrice Sutton's attendance of this Monographs meeting is supported by the Clarence E. Heller Charitable Foundation, a philanthropic charity with a mission to protect and improve the quality of life through support of programs in the environment, human health, education and the arts.

Béatrice Fervers, for the Léon Bérard Centre, France

Elodie Giroux, University Jean-Moulin Lyon 3, France

Thomas Sorahan, for Monsanto Company, USA[4]

Christian Strupp, for the European Crop Protection Association, Belgium[5]

Patrice Sutton, for the University of California, San Francisco, Program on Reproductive Health and the Environment, USA[6]

**IARC secretariat**

Lamia Benbrahim-Tallaa, Section of *IARC Monographs*

Rafael Carel, Visiting Scientist, University of Haifa, Israel, Section of *IARC Monographs*

Fatiha El Ghissassi, Section of *IARC Monographs*

Sonia El-Zaemey, Section of the Environment

Yann Grosse, Section of *IARC Monographs*

Neela Guha, Section of *IARC Monographs*

Kathryn Guyton, Section of *IARC Monographs (Responsible Officer)*

Charlotte Le Cornet, Section of the Environment

Maria Leon Roux, Section of the Environment and Radiation

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Dana Loomis, Section of *IARC Monographs*
Heidi Mattock, Section of *IARC Monographs (Editor)*
Chiara Scoccianti, Section of *IARC Monographs*
Andy Shapiro, Visiting Scientist, Section of *IARC Monographs*
Kurt Straif, Section of *IARC Monographs (Section Head)*
Jiri Zavadil, Section of Mechanisms of Carcinogenesis

**NOTE REGARDING CONFLICTS OF INTERESTS:** Each participant submitted WHO's Declaration of Interests, which covers employment and consulting activities, individual and institutional research support, and other financial interests. Participants identified as Invited Specialists did not serve as meeting chair or subgroup chair, draft text that pertains to the description or interpretation of cancer data, or participate in the evaluations. The Declarations were updated and reviewed again at the opening of the meeting.

**NOTE REGARDING OBSERVERS:** Each Observer agreed to respect the Guidelines for Observers at *IARC Monographs* meetings. Observers did not serve as meeting chair or subgroup chair, draft any part of a *Monograph*, or participate in the evaluations. They also agreed not to contact participants before the meeting, not to lobby them at any time, not to send them written materials, and not to offer them meals or other favours. IARC asked and reminded Working Group Members to report any contact or attempt to influence that they may have encountered, either before or during the meeting.

Posted on 26 January 2015, updated 30 March 2015

1 Peter P Egeghy received "in kind" support and reimbursement of travel expenses of on average less than US $2.000 per year during the last 4 years from participation in meetings sponsored by the American Chemistry Council, an industry trade association for American chemical companies, and the Health and Environmental Sciences Institue (HESI), a nonprofit scientific research organization based in Washington and funded by corporate sponsors.

2 Christopher J Portier receives a part-time salary from the Environmental Defense Fund, a United States–based nonprofit environmental advocacy group.